



On the Hedge Plants of India, and the conditions which adapt them for special purposes and particular localities. By Dr. HUGH F. C. CLEGHORN, Hon. E.I.C.S.*

IT is my purpose to notice the hedge-plants observed in the Peninsula, as well as a few indigenous species of frequent occurrence, from the employment of which advantages may be derived. My intention is to glance at them under their botanical and agricultural characters, and to allude to some which deserve to be generally diffused with a view to their œconomical properties and practical utility.

Since my admission on the Madras establishment in 1842, I have traversed a considerable portion of that Presidency in the execution of duty, including the Southern Division, the territories of Mysore, with parts of Canara, and the Southern Mahratta country. Along the line of march, and in the course of botanical rambles, I made rough camp notes as to the vegetation and general appearance of the country. From want of leisure, these were unavoidably very imperfect, yet they may serve to attract attention to a subject which seems to me of no small importance; and I trust some little advantage may be derived from my observations.

The system of Indian husbandry continues much in the rude state our fathers found it a century ago. In the day of rapid progress at home, agriculture in Hindostan evinces few signs of improvement. The farming utensils are simple and wretched; the most abject utilitarianism characterizes field operations. With the Ryot no motive seems to exist beyond providing the means of immediate subsistence: he scratches the soil with his black-wood plough, tipped with iron, and made light with the pole of bamboo, so as to be carried on the shoulder; he drops

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the seed upon the furrow, drags a log of wood,—hollowed like a trough but open at the ends,—to break the clods and smoothen the surface, or draws a few thorny branches of *Acacia* over the field, which may be termed the brush-harrow of the Hindoo: nature has been bountiful—man is indolent, and gives himself no concern about his crop, trusting for the anticipated harvest to the immense productiveness of the soil, which yields, in many parts thrice a year, such abundant crops under the favouring rays of a tropical sun, that the cultivator is not stimulated to farther exertion. The Ryot, however, understands irrigation and the succession of seasons, but knows little regarding the biennial or triennial rotation of crops. The sites of tanks are invariably well chosen, being selected where one or more *nullahs* or water-courses naturally meet in a convenient locality for embankment. Manure is never employed on the cotton plains, although usually in sugar-cane fields, and to a great extent in Sooparee gardens, as well as to the root of grape vines and pine-apples. The manure used generally consists of rotted leaves, cow-dung, wood ashes, blood, dead fish, &c.; and indeed the dunghills of Betel plantations are so valued as occasionally to become the subjects of litigation. I would simply mention the fact that economy is not practised in the employment of animal manures. In 1846–47 large quantities of bones of animals that had died of disease and drought, were scattered over the plains, in the Mysore territories. I had a portion collected in heaps, ground to fragments in a Chunam mill, and then sparingly applied to a potato field: the result showed the fertilizing effect.

There is no spring of activity among the aborigines of these unhappy lands; hence it becomes the especial duty of the Agricultural Societies at the different Presidencies, of the Chambers of Commerce, and of every enlightened and liberal member of the community, to aid and encourage the regeneration of the agricultural system.

Whilst deploring that past exertions have been retarded by the indisposition of the natives to adopt the improvements of science and the suggestions of practical men*, “which they foolishly conceive to be unprofitable innovations,” there is ground for consolation in observing that the results of “*persuasion, patience and perseverance*” are visible in the improved face of the country over large tracts, as Mysore, the Ceded districts and Southern provinces, which have been longest under our rule, and in which a cessation from war has enabled our resources to be devoted more assiduously to *the triumphs of peace*.

This altered aspect has been brought about by the bridging

* Madras Athenæum, May 9th, 1843.

of rivers and nullahs; the formation of Ghauts, by which the inland traffic reaches the coast; the abolition of transit duties; the extension of made roads; the increased number and better construction of labour-carts, arising from increased facilities of intercourse; and the completion of other public works, as Moosaffir-Khanahs, Choultries, Travellers' Bungalows, &c. Let us hope that as the various impediments are successively removed, in process of time our modes and systems will be better understood and appreciated; the lands will be more generally manured, the fields enclosed, and the roadsides fenced; additional tracts cultivated, and English improvements gradually introduced into Hindostan,—giving an impetus to commerce throughout the country.

As the *climate* widely varies in different parts of the Peninsula, so the *aspect* of the country, the soils and productions of the districts, the modes of cultivation, and the facilities of traffic differ in an extraordinary degree, and those cultivators accustomed to one method of agriculture can seldom manage any other.

The arid sands of Madras, the undulating plateau of Mysore, the extensive plains of the Deccan, the primæval forests of Coorg and Malabar, the jungles of Hyderabad and Nuggur, present botanical and geological features strikingly dissimilar*. There is as much variety in the surface of the ground as there is in different parts of Europe: indeed so complete is the contrast between the extreme sterility of some tracts of the Carnatic plains, which exhibit a painfully barren picture of desolation from the total absence of wood, and the luxuriant arboreous vegetation of the Neilgherry slopes, which the researches of Wight prove to possess one of the richest floras in the world, that no two countries in Europe display more opposite characteristics. The climate of the former is remarkable for excessive drought, so that European furniture invariably cracks and warps, whereas in the vicinity of the Malabar Ghauts the south-west monsoon is felt in full force, and the fall of rain exceeds 120 inches in the season, producing an atmosphere so charged with humidity that the lancet in my pocket has been covered with rust in a few days. It must be clear, therefore, that in suggesting as worthy of trial any vegetable products calculated to enrich and improve the country, great attention must be paid to the question of local applicability. The effects of moisture greatly favour the growth of most species, while a very dry state of the air is incompatible with the life of others.

* Hence the importance of specific habitats being given to every specimen in our Indian herbaria; not such a vague one as "*India Orientalis*" or "*Montes Hindostaniæ*."

The *Cacti*, *Agaveæ* and *Euphorbiæ* are adapted to the arid districts, their structure enabling them to exist, when refreshed with only occasional showers; the *Mimoseæ* and *Cæsalpineæ* seem to enjoy the somewhat more cold and moist climate of the Balaghaut districts; while the *Bambuseæ* and *Pandaneæ* luxuriate in the rich loamy soil of the Mulnad (*i. e.* Rain country). Hence, were a railway* to cross the Peninsula, the fences ought to differ as the line is continued through various districts, in accordance with the conditions under which particular plants thrive best between certain limits of temperature and moisture. The great prevalence of spiny shrubs and prickly bushes all over India is remarkable to every one; they are a continual source of annoyance to the traveller, and a fruitful cause of admission into hospital, as every regimental surgeon can testify.

Scutia indica (Brong.), *Zizyphus* (four species), *Solanum indicum* (L.) and *trilobatum* (L.), *Toddalea aculeata* (Pers.), *Pterolobium lacerans* (R. Br.), *Carissa carandas* (L.), *C. diffusa* (Rox.), *Azima tetracantha* (Lam.), *Smilax ovalifolia* (Rox.), *Acacia*†, *Mimosa*, many species, and other armed climbing plants, are widely diffused. These often grow interlaced in thickets, or surround the clumps of jungle like a fringe—presenting a rampart which is almost impenetrable, especially when forest conflagrations have occurred and a dense tangled underwood has succeeded. The long flexuous stems of several species of *Calamus* are particularly troublesome, obstructing all passage through the unfrequented forests of the Malabar Ghauts, and even when the path has been cleared with a bill-hook, the graceful tendrils unobserved frequently trip the most cautious traveller, and the recurved prickles are with difficulty unhooked from his clothes.

Again on the open ground the traveller's progress is impeded by *Echinops echinatus* (Rox.) with its globular spinous heads, *Tribulus lanuginosus* (L.) with its hairy pointed fruit, *Solanum Jacquini* (Willd.), completely armed with prickles, *Barleria prionitis* (L.) and *buxifolia* (Rox.), spreading everywhere in Mysore, *Asteracantha longifolia* (Nees) on the margins of ditches and tanks, which has six to eight spines at each verticil, *Lepidagathis* (two species), with spinous pointed leaves.

The prickles and spines of these plants wound the barefooted pilgrim, especially during the hot months, when the leaves having

* Whilst writing these pages, Dr. Royle, the F.I. Company's botanist, informed me that an official reference had been made to him concerning the plants best adapted for hedging the Indian railways, now in progress.

† One of the most remarkable is *Acacia latronum*, W., common in the barren tracts, armed with large white stipular thorns united at the base. Linnæus designated it "*Frutex horridissimus, ramosissimus*:" it is entitled to this distinction.

dropped off, the thorns are left bare and exposed, which renders travelling extremely difficult in some parts, as the spines are so strong as to pierce a shoe or sandal of dressed leather; and if the weary traveller seek to rest himself, he must beware as much of thorns, as of red ants, tarantulæ, and other biting insects which infest the soil. Innumerable climbers festoon the Euphorbiaceous hedges, enveloping them with their umbrageous leaves, and showing off their elegant and many-tinted blossoms to the best advantage on these nearly leafless shrubs.

The rich inflorescence bursts forth towards the close of the rains. All do not unfold their flowers at once—a continuous succession of blossom is presented throughout the year in the subalpine districts, which are under the influence of the S.W. monsoon. These strong climbing plants, consisting chiefly of *Convolvulaceæ*, *Cucurbitaceæ*, *Apocynaceæ* and *Asclepiaceæ*, delight the eye and often diffuse an agreeable fragrance, but by their rank luxuriance prove very destructive to enclosures. Some of those most frequently met with are as follows:—

CUCURBITACEÆ.

Mukia scabrella, *Bryonia laciniosa*, *epigæa* and *mysorensis*, *Coccinia indica*, *Trichosanthes Cucumerina* and *palmata*.

CONVOLVULACEÆ.

Ipomœa sepriaria and *vitifolia*, *Pharbitis nil*, *Quamoclit pinnatum* and *phœniceum*, *Argyrcia aggregata* and *bracteata*, *Calonyction speciosum* (Ch.).

ASCLEPIACEÆ.

Oxystelma esculentum, *Dæmia extensa*, *Holostemma Rheedii*, *Pergularia odoratissima*.

APOCYNACEÆ.

Ichnocarpus frutescens (R. Br.), *Carissa carandas* (L.), *C. dif-fusa* (Rox.), *Vallaris pergularia* (Burm.).

The herbaceous plants generally met with, enjoying the shelter of the hedges by the roadsides, are suffruticose *Malvacæ*, *Mirabilis Jalapa*, *Plumbago zeylanica*, *Decringia celosoides*, *Asystasia coromandeliana* (N. E.), *Peristrophe bicalyculata*, *Bocrhaavia* (two species), *Basella alba*, *Cardiospermum Helicacabum* with balloon-like capsules, *Abrus precatorius*, *Mucuna prurita*, *Canavallia vi-rosa*, *Clitorca ternatca*, a blue and white creeper of great beauty. The cyan hue of the *Clitoreia*, with the yellow petals of *Abu-tilon*, and the pure white of *Coccinia indica*—found in every hedge—offers a truly splendid appearance.

After these preliminary notes, as to the abundant provision in nature for the extensive diffusion of hedges, let us see to what

extent the plants adapted for live fences have been made subservient to that use in the œconomy of agriculture. Supplied with such materials for hedge-making as few countries possess, we have wretched enclosures,—in many parts none at all, and cultivators go on in the old way of their ancestors, whose footsteps they follow with the utmost devotion and reverence. Some carefully tie the necks of the sheep and donkeys to their forelegs to prevent their straying over the plains: other villagers by general agreement drive away the cattle at the beginning of the monsoon, and again permit them to roam unherded as soon as the rains are over.

If the traveller stations himself on one of the detached conical hills or droogs, which form a peculiar feature of Southern India, for the purpose of obtaining a bird's-eye view of the surrounding country, he probably finds during the rainy and cold season, a fine sheet of cultivation, comprising a great variety of cereal, leguminous and oleaginous plants, sown with regularity and spreading round the scattered mud-built villages to a great extent: the fields in full flower look beautiful and give an appearance of prosperity. During the hot season the scene is very different; few are the traces of vegetation,—an arid plain then stretches around you; the sun acts so powerfully as to produce fissures and cracks all over the ground. “The surface of the plain presents a monotonous and almost treeless extent of arenaceous waste, bounded by the horizon, and unbroken save by a few rocky elevations that stand forth abruptly from the sheet of black soil like rocks from the ocean.”

“Sir Thomas Munro might well observe that these (the Ceded) districts are more destitute of trees than any part of Scotland he ever saw, and that the traveller scarcely meets with one in twenty miles, and nowhere with a clump of fifty*.”

Since the time of that enlightened governor, much has been done to improve the physical aspect of the country, by the plantation of numerous tops of *Bassia latifolia* (Mahwa) and avenues of *Ficus indica* and *religiosa* (banyan and peepul), which being planted on both sides of the trunk-roads afford a pleasant shade.

The custom generally is to separate the patches of arable land when dependent on irrigation by low mounds of earth; when dry by slight fences of dead thorns (*Vachellia Farnesiana*), or by leaving between them uncultivated strips or spaces from 3 to 15 feet wide, sometimes broader (according to the value of the

* Capt. Newbold in ‘Madras Journal of Science,’ vol. x. p. 113. Since writing the above we have heard of the lamented death of this able and distinguished geologist, at a time too when diligently employed in publishing his researches.

land). These are overrun with spinous plants, studded with dwarf Mimosas, or at certain seasons thickly covered with long grass: these interspaces add to the beauty of the country, and contribute in some measure to the fertility of the soil by preserving a little moisture; but their irregularity presents a very slovenly appearance, and the brush is often inhabited by wild hogs and antelopes which greatly damage the crops. Fences as in England are few and rarely to be seen. Some of the fields are surrounded by hedges; but these are not kept in such repair as to resist the pressure of cattle: they are frequently meant only to distinguish the lands appertaining to particular estates or classes of the villagers.

The hedges observed in our wanderings generally consisted of *Opuntia Dillenii* (Haw.), *Euphorbia Tirucalli* and *antiquorum*, with *Agave americana* (L.). When the ground is sown, the gaps are filled up with branches of *Vachellia Farnesiana*, a small tree which grows in many fields.

It is only in the neighbourhood of large towns, encircling the smaller villages, military cantonments, missionary settlements, or the dwelling-houses of intelligent foreigners, that we find ornamental or even regular enclosures. A few very fine hedges demonstrate how well they would thrive, and show the practicability of agricultural improvement, if the will and energy existed among the natives. The hedges of the country in general, even when kept up as fences round temples, are in a very slovenly condition, and are ruined by being overgrown with rank climbing plants, such as those previously enumerated.

Opuntia Dillenii, Haw.

Cactus indicus, Rox.

Hedge Prickly Pear.

Nag phena, *Hindustani*.

Naga-kulli, *Canarese*.

Probably introduced from South America, though so long domesticated all over India, that many consider it a native.

Commonly used as a hedge-plant about cantonments, forming an impenetrable fence, 4 to 6 feet high; but excludes the air, and harbours destructive vermin and venomous reptiles. Cultivators object to it, because it spreads, cannot be kept within bounds, and impoverishes the land.

The hotter the district the more luxuriant this plant: it flowers at all seasons, and grows in the most sterile ground—in sand—in the rocky beds of rivers—in the fissures of mud walls. It is easily propagated by planting leaves in the earth half buried; they seldom fail to strike root and prosper; it is difficult to eradicate; the figs are eaten sparingly in times of scarcity. Spines one to three together in a tuft.

Sir Hans Sloane mentions in his 'History of Jamaica' that, "In the Island of St. Christopher, when it was to be divided between English and French, it was ordered by the consent of the two nations that there should be planted three rows of the *Opuntia tuna* as a boundary, thinking these the strongest fortification to hinder the attempts of one another in cases of war." The Grecian traveller, Clarke, has suggested that in some latitudes it might serve as an outwork for fortifications; since, as he says, "artillery has no effect upon it; pioneers cannot approach it; fire will not act upon it; and neither infantry nor cavalry can traverse it."

In fact in the Spanish colonies in America this plant is considered as a very important means of military defence, and is propagated constantly around fortifications with that intent. Desfontaines in his 'Flora Atlantica' remarks of *O. tuna*: "Munimentum hortorum et domorum impenetrabile."

We object to the prickly pear from its unsightly appearance, "the enormous area it covers, and the harbourage of every variety of filth and vermin." It should only be employed when none of the plants aftermentioned will grow. The cantonments of Hurryhur and French Rocks have been greatly improved by the substitution of neatly kept milk-hedges for the prickly pear, which formerly deformed them. The bandieoot rat (*Mus malabaricus*, Shaw, *M. giganteus*, Hardwicke), a most destructive animal, is partial to hedges of the *Opuntia* and *Agave*, burrows under them to a great depth, and roots up the seeds of garden plants sown near its haunts.

Pereskia aculeata (Haw.), the West Indian gooseberry, grows readily, and seems likewise well adapted for hedges.

Agave americana, L.

A. Cantula, Rox.

Fourcroya Cantula, Haw.

[Figured in Lindley's Vegetable Kingdom, 2nd ed.]

The American Agave. Native name: *Wilacete Ananas*, i. e. English Pine Apple. Sans. *Kantula*.

Introduced from America.

In some parts the hedges are formed almost exclusively of this stately aloe-looking plant, which is both ornamental and useful. The flower-stalks rise to the height of 15 to 30 feet, when ten or twelve years old, and are employed in roofing. It flowers in the rains.

The long sheathing leaves are sometimes macerated for the fibres, which are separated by beating on stones, and form

excellent cordage. The lower decayed leaves are used as fuel in the absence of wood, and the terminal spines sometimes serve instead of pins and nails. The Agave juice is not collected in India, vinous beverages being formed from the date and cocoa-nut palms, which flourish in the same localities. These latter trees, with the *Agave*, *Opuntia*, and Bamboo, give a character to the landscapes in Southern India. This species is propagated by suckers, and young plants are in great request. There are hedges of this plant in Spain, Portugal, Sicily, Calabria, West Indies, South America, Mauritius, Cape Town. Native gardens are often surrounded by mud walls, armed with Agave leaves, the spines being made to project at both sides.

Euphorbia Tirucalli, L.

Ossifraga lactea, Rumph. Herb. Amb. vii. t. 29.

Milk Bush.

Lunka-sij, *Beng.* Tiru-kalli, *Tam.* Doodu-kalli, *Can.*

Probably introduced from Africa.

This, with *E. antiquorum*, is common all over the Madras Presidency, growing abundantly anywhere on the rough and rocky parts of the Deccan, though doubtfully indigenous. It is much used as a hedge-plant, and though unarmed makes an excellent fence. It grows to 20 feet high; but should be annually clipped, as it becomes open at the roots. It is customary to plant *E. antiquorum*, L. (Nar-sij) in these openings, which grows well under the shade of its congener. Both united constitute a most serviceable enclosure, which has the advantage of occupying *little space* and being *touched by no animal*: the tenacious aerid juice quickly causes sneezing or produces ophthalmia.

At the beginning of the rainy season a trench is dug to the depth of two feet where the fence is intended to grow. The cuttings take root in any soil; and in one year it becomes a tolerable fence (Buchanan's Journey, i. 36). The villagers are prejudiced against this as a fence, and cut it down in seasons of pestilence, supposing that it exerts a baneful influence. The juice is often employed instead of a wafer for closing despatches, and is a very effectual blister in rheumatic affections. Cattle will not break through, nor vermin live under it. The trunk of old trees affords a yellow close-grained wood, 8 or 10 inches in diameter, which is valued for gun-stocks, &c.

These four plants thrive in the most arid soil: when the ground seems much parched they retain their greenness, and improve the scenery, giving an appearance of verdure when all else is withered and lifeless.

Euphorbia nivulia, Buch.*E. neriifolia*, Hort. Beng.*Ela Calli*, Hort. Malab. ii. t. 43.Sij, *Hind.**Ela Calli*, *Can.*

A poor-looking tree, grows abundantly in the rocky parts of the Deccan, and forms a common hedge, delighting in the arid districts. "Habitat ubique in Indiæ sepibus."—*Buch.* It has a whitish dead appearance, resembling a bundle of dry sticks, and unless for a short period during the rains, when it puts forth a few leaves, rather takes from than adds to the appearance of the landscape (*Graham*). The branches being as thick as the stem, their accumulated weight often breaks it, and the plant falls to the ground.

Cæsalpinia sepiaria, Rox.

Mysore Thorn.

Hyder ka Jar, *Hind.*, i. e. Hyder's Plant.

A showy scandent shrub, armed with short strong recurved prickles. This plant is invested with historical interest, Hyder Ally having employed it much as a protecting hedge around his strongholds. The fences are handsome, and almost impenetrable. The village fortifications in the Mysore territories have in a great measure fallen to pieces; but the remaining mud walls are still encircled by stout hedges of this and *Pterolobium lacerans*, as are also the dwellings of the Pariahs who are not permitted to build within the village walls. It is generally used as a fence in the Baghyat lands of the Deccan. Indigenous in the subalpine districts, and has been domesticated at Madras and in Bengal, where it is now nearly as common as in Mysore. Hyder's plant possesses the advantages of beauty and durability, is easily raised from seed in rows wherever the fence is to be established, and seems to grow vigorously both above and below the Ghauts in almost every climate. The hedge requires little care beyond shortening the side branches by occasional pruning. The base is generally substantial, so as effectually to resist the pressure of cattle and to prevent the ingress of destructive vermin.

Cæsalpinia Sappan, L.

Sappan Wood.

Patanga-mara, *Can.*

An armed climbing shrub planted in garden or other fences; it is easily reared from seeds in almost any soil, if the plants are watered during the dry weather. After ten or twelve years the wood of the plant becomes valuable for its red dye, and is exported extensively from the western coast*.

* Mad. Top. Report, i. p. 495.

Pterolobium lacerans, R. Br.*Cæsalpinia lacerans*, Bueh (Journey, i. 37).

A common jungle shrub in wooded districts, aptly designated *lacerans* by Roxburgh, for it is *completely armed*, and as dreadful as the Kantuffa of Bruce*, which belongs to the same genus. The legume is curious, ending in a membranous knife-shaped wing. When associated with *C. sepiaria* it makes an excellent fence; singly it is rather diffuse.

Guilandina Bonduc or *Bonducella*, L.

Nicker Tree.

Nata, Bengal.

Kad Gajaga, Can.

A handsome well-armed shrub common in hedges of Mysore and Canara: forms an impenetrable fence. Seeds solitary, like marbles, and are a favourite remedy in catarrh and ephemeral fever.

Parkinsonia aculeata, L.

Prickly Parkinsonia or Jerusalem Thorn.

A handsome low-sized tree, not unlike the laburnum, planted for fences, which are very beautiful, from the bright green and feathery foliage, and pretty yellow flowers in loose pendulous racemes. It seems well adapted for hedges, and is naturalized in many districts. Observed at Cairo by Hooker, and in Jamaica by Macfadyen, at Bellary by Newbold, and about Bombay by Graham.

Poinciana pulcherrima, L.

Gool Mohur. "Peacock's Pride."

A common armed shrub in every garden, reared more for the beauty of its flowers than as a serviceable fence. *P. elata*, L., is a more showy plant, not so frequently met with, and unarmed. "In Barbadoes *P. pulcherrima* is planted for a fence, and to distinguish fields from one another, both for its use and ornament. I thought I never saw anything finer than a hedge of this †."

Mimosa rubicaulis, Lam.

A large climbing shrub, well armed; common in Mysore; rather straggling, but capable of forming an elegant fence; conspicuous from the purple flowers changing to white. I am not aware that this species has been tried.

Inga dulcis, Willd.

Koorka poolly, Teling.

A handsome tree, introduced from the Philippine Islands according to Roxburgh, and there probably from America, of which

* Travels in Abyssinia, vol. v.

† Sloane's Jamaica, p. 50.

it is a native. It is now frequently met with, being much employed as a fence, particularly below the Ghauts. I have observed a thriving hedge at Shemogah, which was an excellent substitute for prickly pear in enclosing a compound. I have seen Inga hedges at Bangalore and in Capetown. The pulp of the curiously twisted seeds is sweet and nutritious; hence the specific name.

Acacia arabica, Willd.

Babool, *Hind.*

Karijalee, *Can.*

The most common indigenous tree, known to all travellers—often the only visible tree, thriving in every soil. Seeds and pods of great value to the shepherd in the hot season as food for his flock. Dr. Gibson suggested some years ago that the waste parts of the Deccan should be planted with this tree, as it grows rapidly, and requires no water. The timber is used for tools and tent-pegs, the bark for tanning, and the gum as a substitute for wafers in the public offices. When covered with its globose heads of yellow flowers it gives a smiling aspect to the arenaceous waste; and Moore aptly introduces it in an Arabian scene:—

“Our rocks are rough, but smiling there
The *Acacia* waves her yellow hair
Lonely and sweet, nor loved the less
For flowering in a wilderness.”

Acacia concinna, DC.

Mimosa saponaria, Rox.

Shigai or Shikakai, *Can.*

A large climbing plant with numerous aculei. Some villages and coffee gardens are surrounded with strong hedges of this plant, which are rented annually in Nuggur, the thick saponaceous legumes being articles of trade, and sold at the rate of three for a pice; used as soap for washing the hair, &c. (Buchanan, i, 38.)

Vachellia Farnesiana, W. & A.

Kalee Kikur, *Hind.*

A small tree common everywhere in hedges and fields. The branches are lopped off for fuel, and for repairing the fences. This is a most useful tree, affording timber for ploughs, bandies, and other agricultural implements.

All these *Mimoseæ* and *Cesalpineæ* are of easy culture. Cuttings of them root freely.

Bambusa arundinacea, Willd.

Arundo Bambos, Linn.

The Common Bamboo.

Bans, *Beng.*

This arborescent grass is capable of forming an excellent fence,

and is used extensively for gardens and fields in Coorg, the Southern Mahratta country, and Guzerat, where it grows in the greatest abundance, delighting in the rich soil along the edge of mountain streams. It requires a much more humid climate than the prickly pear or milk bush. These abound in the Carnatic plains, while the bamboo flourishes everywhere beside the water-courses of the Western Ghauts: "omnium vulgarissima." (*Buch.*) It forms a dense and graceful underwood: when luxuriant it occupies too much space and harbours vermin. To obviate this, the young thick shoots should be removed frequently and carefully, and the lateral branches only allowed to remain. From its singularly rapid growth it exhausts the soil where it grows, and deprives the ground of its nourishment, instead of preserving its moisture. "Bamboo fences are peculiarly adapted to pasture land, the cattle browsing on the young shoots keeping down their growth, so that very little additional care is required*."

Buchanan (*Journey*, i. 5) mentions with commendation that Mr. Place, a collector, of Areet, "caused each village to be surrounded by a hedge of bamboo: by this measure a large quantity of that most valuable plant will in time be raised," which is applied to a great variety of æconomical purposes. In times of scarcity the seeds are eaten by the poorer classes of Mysoreans, mixed with honey. The inflorescence I have only observed in rich moist situations, and in these its favourite haunts the thorns are sometimes absent.

There are several species of bamboo. *B. spinosa*, by the number and strength of the spines and branches, is said by Roxburgh to form the most impenetrable jungle of India. *B. nana* (Rox.), introduced from China to the Botanic Garden, Calcutta, makes beautiful close hedges; and the *Behoor Bans* of the Bengallees, a variety of *B. Tulda* (Rox.), (*Dendrocalamus Tulda*, Nees), being small, solid, bent to one side, and armed with numerous strong thorns, is very fit for hedges.

Pandanus odoratissimus, L.

Fragrant Screw Pine.

Mundige; also Kaythege-mara, *Can.*

A large spreading ramous shrub, 6 to 10 feet high, having the habit of a gigantic *Bromelia*. Very common in Coorg and Nuggur, and known on the coast of Coromandel as the Kaldera Bush. The patches of hill rice are often fringed with belts of this shrub, forming a natural enclosure. It is sometimes planted for the purpose of hedging. The leaves are 3 to 5 feet long, drooping,

* Macfadyen (*Hook. Bot. Misc.* iii. p. 83), who gives an excellent account of the hedge plants of Jamaica.

armed on the back and sides with strong spines. Avenues of *Pandanus* are seen in China and Cochin-China, and in the Mauritius (*Loureiro* and *Hardwicke*). It answers well for hedgerows, but requires too much room: it grows well from branches. Often forms impenetrable thickets, which I have been told by hog-hunters are a favourite resort of these animals. The sweet-scented flowers are much prized, and often sell in the bazaars at two annas a piece.

Capparis sepiaria, L.

A much-branched shrub of low size, with very strong and sharp recurved prickles, very common in the uncultivated tracts of Mysore. This and *C. incanescens*, W. & A., form whole jungles at the foot of the Bababooden Hills, and in the South Mahratta country. It is an excellent plant for hedges: we have admired some fine village hedges in the Shikarpoor talook. "Habitat ubiquæ in Indiæ dumetis, solo aridiore."—*Buch.*

C. horrida, L., *C. aphylla*, Rox., *C. Roxburghii*, Wight, and *C. incanescens*, W. & A., are worthy of trial, though more straggling than *C. sepiaria*. The first is very common in Mysore, likewise the second, much sought for its berries, which are pickled. The latter grows everywhere in Scinde and Guzerat.

Balsamodendron Berryi, Arn. Ann. Nat. Hist. iii. 85.

Protium Gileadense, W. & A. Exc. Syn.

Amyris Gileadensis, Rox. Exe. Syn.

A most common spinescent plant in some parts of the country, and constantly used for making fences. (*Wight.*)

Toddalea aculeata, Pers.

Scopolia aculeata, Sm.

Paullinia asiatica, L.

Toddali, *Can.*

A prickly shrub, with trifoliate leaves, common in the hotter parts. It is usually of a very ramous character, and might be employed in the formation of hedges. We observed it in many parts of Mysore and the South Mahratta country, and have experienced infinite difficulty in attempting to make our way between the bushes. The flavour of the black seeds is pungent, resembling pepper. The berries make an excellent pickle.

Pisonea aculeata, Rox.

A very common large straggling shrub, armed with strong axillary recurved thorns. It makes excellent impenetrable fences,

and when fairly caught in it, it is no easy matter to be extricated, the prickles being so numerous, crooked and sharp.

Both Kœnig and Roxburgh were so situated amongst the Vendalore Hills, near Madras; hence the former named it *Tragularia horrida*, not at that time suspecting it to be *P. aculeata*. (Rox. ii. 217.)

Hemecyclia sepiaria, W. & A. in Edin. New Phil. Journ. xiv. 297; Wight, Cat. 940.

This Euphorbiaceous plant forms a rigid densely interwoven shrub rising to 8 or 10 feet, of rather frequent occurrence. The leaves are extremely hard, and resemble those of *Celastrus emarginatus*.

Epicarpurus orientalis, Blume.

Trophis aspera, Retz.

Streblus asper, Lour.

Suna Gargathee-mara, Can.

A rigid milky tree of small size, with numerous interwoven branchlets, common everywhere in India. Leaves scabrous, employed for polishing ivory and furniture. Wood used for fuel; berries eaten by birds. Much used as a fence, for which it is well fitted by its very ramous rigid character: though unarmed, it affords good protection by the closeness of its branches. Detached plants form low trees with bushy heads.

The scarp of Fort William is strengthened by an impenetrable hedge of *Trophis aspera*. (Hook. Misc. iii. 29.)

Jatropha Curcas, L.

Angular-leaved Physic Nut

Mara harulu, Can.

Domesticated all over India. A most common bush, seen growing round the little native gardens throughout Mysore. It is of speedy growth, attaining the height of 6 or 8 feet; but forms a bare, seraggy, useless enclosure. The leaves are deciduous; the seeds are purgative; the stems are soft and spongy, and will not even burn. "Colitur ubique in Indiæ sepibus."—*Buch.*

Rhamnus circumscissus, L.

Scutia indica, Brong., Wight Ill. t. 73.

A straggling shrub armed with recurved prickles overrunning the country, particularly towards the Ghauts. It would, from its sharp aculei and numerous diverging branches, form an excellent hedge-plant.

Azima tetracantha, Lam.

Monetia barlerioides, Rox.

Trikanta-jatee, Hind.

A common thorny bush, frequently associated with *Scutia indica*. It somewhat resembles in habit the English furze. It grows freely in every soil, giving off many opposite branches, spreading in every direction. The spines are quatern, axillary, sometimes 2 inches long. The white berries are eaten by men and birds.

Gmelina asiatica, L.

A pretty shrub, of a very ramous character, common in the Peninsula, bearing large yellow flowers, and opposite thorns in the axils of the branches. It forms an elegant and excellent fence in the gardens of Bombay. (*Graham*.)

Rumphius wrote of this plant, "Frutex stipitosus qui sese sursum explicat in longos et flagellosos ramos."

There are many ornamental plants which we often observe arranged in straight lines, forming inner fences or shady avenues in Eastern gardens. These are the *Lawsonia inermis*, the Henna plant of Egypt (*Mendi*), resembling the English privet. The *Lonicera ligustrina*, Wall. (privet-like honeysuckle), is much used at Ootacamund, and answers well, forming a very compact fence about gardens. (*Wight*.)

The lime, mulberry and pomegranate are suitable, and have been long in use; likewise the *Hibiscus rosa sinensis*, L. (shoe-flower), *Adhatoda vasica* and *Betonica*, Nees, *Gardenia florida* (*Gundha raj*), *Allamanda cathartica*, &c.

Phyllanthus reticulata, Poir. (*P. Vitis-Idæa*, Rox.), "found wild in every part of India, and seems to thrive well in all soils and situations. It is frequently employed for ornamental hedges in gardens, for which end it is well chosen, as its thick evergreen foliage and constant succession of beautiful red berries give it a pretty appearance*." I am not familiar with this in southern India, except as a small jungle tree.

Pedilanthus tithymaloides, Poit. (the slipper plant) is much planted as a border for gardens, taking the place of box. Neither goats nor cows will touch it. The following are also used for garden borders:—

Graptophyllum hortense (*Justicia picta*) with its variegated leaves; *Vinca rosea*, Willd., common all over India; *Heliotropium curassavicum*, L., domesticated at Bangalore; *Rosa indica*, L.; *R. semperflorens*, Curtis.

The above are the hedge-plants most frequently noticed in the

* Roxburgh's Fl. Ind. ii. p. 665.

Peninsula. The number is a large one, to which I could have added many more, indigenous in the jungles, which have not been tried. We have confined our remarks to quick hedges “vivæ sepes,” because they are obviously preferable to every other mode of protecting agricultural produce in a climate like that of India. Ditches are particularly unsuitable, rapidly filling up with rank vegetation, and their sides often giving way under the violence of the monsoon. Stone walls are rarely seen, being expensive and always badly constructed. Wire fences, coated with dammer, were introduced at Bombay by the energetic Dr. Buist in 1843; these unquestionably form a light and elegant enclosure for oriental compounds, but are too expensive to come into use among native cultivators.

The subject is truly important. Large tracts consisting of many acres together, wholly or partially uncultivated, and the frequent occurrence of seasons of scarcity, attest the still neglected state of Indian agriculture, while the remains of quickset hedges, decayed terraces and ruined wells in many parts convey the impression that irrigation and husbandry *in remote ages* had been practised more assiduously than by the present generation.

One of the obstacles to improvement we believe to be, that from the time the grain appears above ground till the harvest is gathered in, the ryot has to watch his field; but as many wild hogs and other animals infest the neighbouring jungle, this watching is difficult and often ineffectual, and hinders the farmer from extending his operations*. We know too from the official return on cotton culture in India (pp. 444, 489, 490), and from the testimony of many collectors and other observers†, that great devastation takes place annually from herds of antelopes and thousands of heads of cattle which migrate or are driven from place to place in particular seasons. The wild animals are being destroyed in large numbers, and as cultivation extends will find no shelter, while the damage occasioned by stray bullocks could be prevented by encouraging a more general system of field enclosures.

“The frequent fearful occurrences of famine in India remind us of the almost forgotten period when they were of as frequent occurrence in Europe, and the inference follows, that when the light of European science has extended to India the same bene-

* Asiatic Researches (Carey), x. 34.

† Dr. Gibson, Superintendent of the Botanical Gardens at Dapooree, states with reference to an experiment (sowing of upland cotton), that it was one on which a general conclusion could not be based, inasmuch as the field enjoyed the shelter of a hedge on one side and tree plantations on other two sides—few of those appliances are to be found in nine-tenths of the villages of the Deccan.—Bom. Hort. Trans. no. 2. p. 49.

ficial consequences may follow, and that foresight may eventually prepare for, and knowledge obviate many of the evils which now fall without alleviation on the naked head of the native sufferers. The loftiest ambition of the most enlarged mind, when dwelling upon hopes of the most extended usefulness, could hardly imagine a wider range of benevolence." Thus wrote Dr. Kennedy, Physician General, Bombay, whose extensive information and long acquaintance with Western India give his opinion a peculiar value. A season of peace and tranquillity has in providence succeeded to times of anarchy and confusion, and it behoves us to use every effort for developing the resources of those vast countries, and securing the best interests of the many millions committed to our care for higher and nobler ends than our own aggrandizement.

1. Hedge Plants.

<i>Opuntia Dillenii</i> , Haw.	<i>Hemicyclia sepiaria</i> , W. & A.
<i>Agave americana</i> , L.	<i>Epicarpurus orientalis</i> , Blume.
<i>Euphorbia Tirucalli</i> , L.	<i>Jatropha Curcas</i> , L.
— <i>antiquorum</i> , L.	<i>Pisonea aculeata</i> , Rox.
— <i>nivulia</i> , Buch.	<i>Capparis sepiaria</i> , L.
<i>Cæsalpinia sepiaria</i> , Rox.	— <i>aphylla</i> , Rox.
— <i>Sappan</i> , L.	<i>Scutia indica</i> , Brong.
<i>Pterolobium lacerans</i> , R. Br.	<i>Azima tetracantha</i> , Lam.
<i>Guilandina Bonduc</i> , L.	<i>Gmelina asiatica</i> , L.
<i>Parkinsonia aculeata</i> , L.	<i>Balsamodendron Berryi</i> , Arn.
<i>Poinciana pulcherrima</i> , L.	<i>Toddalea aculeata</i> , Pers.
<i>Mimosa rubicaulis</i> , Lam.	<i>Bambusa arundinacea</i> , Willd.
<i>Inga dulcis</i> , Willd.	— <i>spinosa</i> , Rox.
<i>Acacia arabica</i> , Willd.	— <i>nana</i> , Rox.
— <i>concinna</i> , D.C.	<i>Dendrocalamus tulda</i> , Nees.
<i>Vachellia Farnesiana</i> , W. & A.	<i>Pandanus odoratissimus</i> , L.

II. Ornamental Plants forming inner fences.

<i>Lawsonia inermis</i> , L.	<i>Adhatoda vasica</i> , Nees.
<i>Lonicera ligustrina</i> , Wall.	— <i>Betonica</i> , Nees.
<i>Citrus Limetta</i> , Riss.	<i>Graptophyllum hortense</i> , Nees.
<i>Morus indica</i> , L.	<i>Gendarussa vulgaris</i> , Nees.
<i>Punica granatum</i> , L.	<i>Gardenia florida</i> , L.
<i>Phyllanthus reticulata</i> , Poir.	<i>Allamanda cathartica</i> , L.
<i>Hibiscus rosa sinensis</i> , L.	

III. Plants used for edging garden walks.

<i>Pedilanthus tithymaloides</i> , Poit.	<i>Rosa indica</i> , L.
<i>Vinca rosca</i> , Willd.	— <i>semperflorens</i> , Curtis.
<i>Heliotropium curassavicum</i> , L.	

